WHAT IS CLAIMED:

1. A system for optimizing random access channel performance in a communication network using dynamically controlled persistence techniques, comprising:

a plurality of user terminals;

a base station for transmitting information to and receiving information from said user terminals, said base station comprising a base station controller and a base transceiver station which further includes a plurality of channel units;

said plurality of user terminals being synchronized with a system time of said communication network and being operative to access the network by transmitting access requests to at least one random access channel of said network during any one of a plurality of predefined time slots, wherein more than one said access request may be received at any one of the predefined time slots at the same time, thereby causing a collision between the access requests and preventing access to the network by the requesting user terminals;

said channel unit of said base transceiver station being operative to detect collisions between the user terminal access requests, measure the number of collisions during a predefined time interval and provide a resulting collision slot rate to said base station controller;

said base station controller being operative to compare the collision slot rate to a threshold value;

said base station controller being operative to adjust a maximum retry limit accordingly, wherein said maximum retry limit is the maximum number of times a particular user terminal of said plurality of user terminals may attempt to access said at least one random access channel during a particular call session;

said base station controller being operative to adjust said maximum retry limit in order to optimize the collision slot rate for a given load on said at least one random access channel, and provide the adjusted maximum retry limit to the base transceiver station; and

said base transceiver station being operative to broadcast the adjusted maximum retry limit to the plurality of user terminals..

2. A system for optimizing random access channel performance in communication network using dynamically controlled persistent techniques, comprising:

a plurality of user terminals;

a base station for transmitting information to and receiving information from said user terminals;

said base station being operative toprovide at least one random access channel for receiving access requests from said plurality of user terminals during one of a plurality of predetermined time slots which are synchronized with the user terminals;

said base station being operative to determine when more than one said access request is received during a particular time slot, resulting in a collision between the received access requests;

said base station being operative to measure the number of collisions occurring during a predetermined time interval to determine a collision slot rate;

said base station being operative to compare the determined collision slot rate to a predetermined value; and

said base station being operative to adjust the number of access attempts any one of said plurality of user terminals may make to said at least one random access channel during a particular call session.

3. The system according to claim 2, wherein:

a maximum retry limit represents the maximum number of access attempts to the random access channel a particular user terminal may attempt during a particular call session;

said base station being operative to adjust said maximum retry limit to optimize said collision slot rate for a particular load on said at least one random access channel; and

said base station being operative to broadcast said maximum retry limit to said plurality of user terminals.

4. The system according to claim 3, wherein:

said base station is operative to block the access requests having a predetermined priority when said collision slot rate exceeds a predetermined threshold value.

5. The system according to claim 3, wherein:

said base station further comprises a base station controller and a base transceiver station.

6. The system according to claim 4, wherein said user terminal comprises a mobile cellular terminal.

7. The system according to claim 4, wherein said user terminal comprises a satellite terminal.

8. The system according to claim 5, wherein:

said base transceiver station is operative to determine said collision slot rate and transmit the determined collision slot rate to said base station controller;

said base station controller is operative to compare the determined collision slot rate to a threshold value;

said base station controller is operative to adjust said maximum retry limit to optimize the determined collision slot rate for a particular random access channel load;

said base station controller is operative to provide said adjusted maximum retry limit to said base transceiver station; and

said base transceiver station is operative to broadcast said adjusted maximum retry limit to said plurality of user terminals.

9. The system according to claim 8, wherein:

said base station controller is operative to calculate an optimal collision slot rate at an optimal offered load of said at least one random access channel and store said optimal collision slot rate in a transition matrix; and

said base station is operative to compare the determined collision slot rate to the optimal collision slot rates stored within said transition matrix and adjust the maximum retry limit accordingly.

10. The system according to claim 9, wherein:

the optimal collision slot is calculated in terms an optimal offered load on said at least one random access channel by said base station controller according to an algorithm where:

S = throughput, or the mean number of packets successfully received by the base station per timeslot;

G = offered rate, or the mean number of packets offered to the channel per time slot;

P_c = probability of a collision for an arbitrary transmission from a user terminal;

R = transmission burst size for the access channel (excluding guard time) in ms, typically less than the length of a timeslot;

d = cell delay variation (max delay to base station – min delay to base station) in ms;

the throughput and offered load are related by the equation:

$$S = G(1 - P_c), \qquad (1)$$

where

$$P_c = 1 - e^{-G} \qquad (2)$$

where the optimal collision slot rate (CSR) value is determined by an equation yielding CSR in terms of G:

$$CSR = 1 - \left[e^{-G} + Ge^{-G} + \frac{G^2}{2!}e^{-G}(1 - pAvg) + \frac{G^3}{3!}e^{-G}(1 - pAvg)^3 + \frac{G^k}{k!}e^{-G}(1 - pAvg)^{(1+2+\ldots+k-1)} \right]$$

and

$$k = ceil\left(\frac{d}{R/2}\right).$$

11. A base station in a communication network, wherein:

said base station is operative to provide at least one random access channel for receiving network access requests and allowing access to said communication network;

said random access channel includes a plurality of time slots having a predetermined duration;

said base station is operative to determine when more than one said access request is received during a particular one of said plurality of time slots, resulting in a collision between the received access requests;

said base station is operative to measure the number of collisions occurring during a predetermined time interval to determine a collision slot rate; and

said base station is operative to compare the collision slot rate to a predetermined value.

12. A method for optimizing random access performance in a communication network using dynamically controlled persistent techniques comprising the steps of:

providing from a base station at least one random access channel for accessing said communication network;

transmitting from a plurality of user terminals, which are synchronized with a system time of said communication network, access requests to said at least one random access channel during a predefined time slot;

detecting by a channel unit of a base transceiver station of said base station when more than one said access request is received during a particular time slot, resulting in a collision between the received access requests;

measuring by said channel unit the number of collisions occurring during a predetermined time interval and determining a collision slot rate therefrom, and transmitting the collision slot rate to a base station controller of said base station;

comparing at said base station controller said collision slot rate to a threshold value;

adjusting at said base station controller a maximum retry limit accordingly, to optimize the collision slot rate for a particular load on said at least one random access channel, wherein said maximum retry limit represents a maximum number of access attempts to at least one random access channel a particular user terminal of said user terminals may to attempt during a particular call session;

transmitting at said base station controller the adjusted maximum retry limit to said base transceiver station; and

broadcasting from said base transceiver station the adjusted maximum retry limit to said plurality of user terminals.

13. A method for optimizing random access performance in a communication network using dynamically controlled persistent techniques comprising the steps of:

providing from a base station at least one random access channel for accessing said communication network;

transmitting from a plurality of user terminals which are synchronized with a system time of said communication network access requests to said at least one random access channel during one of a plurality of predetermined time slots;

determining at said base station when more than one said access request is received during a particular time slot resulting in a collision between the received access requests;

measuring at said base station the number of collisions occurring during a predetermined time interval to determine a collision slot rate;

comparing at said base station the determined collision slot rate to a threshold value; and

adjusting at said base station the number of access attempts any one of said plurality of user terminals may make to said at least one random access channel during a particular call session.

14. The method according to claim 13, further comprising the steps of:

adjusting at said base station a maximum retry limit to optimize said collision slot rate for a particular load on said at least one random access channel, wherein said maximum retry limit represents the maximum number of access attempts to the random access channel a particular user terminal may attempt during a particular call session; and

broadcasting at said base station said maximum retry limit to said plurality of user terminals.

15. The method according to claim 14, further comprising the step of:

blocking at said base station the access requests having a predetermined priority when said collision slot rate exceeds a predetermined threshold value.

16. The method according to claim 14, wherein:

said base station further comprises a base station controller and a base transceiver station.

17. The method according to claim 16, wherein said user terminal comprises a mobile cellular terminal.

18. The method according to claim 16, wherein said user terminal comprises a satellite terminal.

19. The method according to claim 16, further comprising the steps of:

determining by said base transceiver station said collision slot rate and transmitting said collision slot rate to said base station controller;

comparing at said base station controller said collision slot rate to a threshold value;

adjusting at said base station controller said maximum retry limit, accordingly, to optimize the collision slot rate for a particular random access channel load;

transmitting at said base station controller said adjusted maximum retry limit to said base transceiver station; and

broadcasting from said base transceiver station said adjusted maximum retry limit to said plurality of user terminals.

20. The system method according to claim 19, further comprising the steps of:

calculating at said base station controller an optimal collision slot rate at an optimal offered load of said at least one random access channel;

storing at said base station controller said optimal collision slot rate in a transition matrix;

comparing at said base station controller the determined collision slot rate to the optimal collision slot rates within said transition matrix and adjusting the maximum retry limit accordingly.

21. The method according to claim 20, wherein:

the optimal collision slot is calculated in terms an optimal offered load on said at least one random access channel by said base station controller according to an algorithm where:

S = throughput, or the mean number of packets successfully received by the base station per timeslot;

G = offered rate, or the mean number of packets offered to the channel per time slot;

P_c = probability of a collision for an arbitrary transmission from a user terminal;

R = transmission burst size for the access channel (excluding guard time) in ms, typically less than the length of a timeslot;

d = cell delay variation (max delay to base station – min delay to base station) in ms;

the throughput and offered load are related by the equation:

$$S = G(1 - P_c), \qquad (1)$$

where

$$P_c = 1 - e^{-G} \qquad (2)$$

where the optimal collision slot rate (CSR) value is determined by an equation yielding CSR in terms of G:

$$CSR = 1 - \left[e^{-G} + Ge^{-G} + \frac{G^2}{2!}e^{-G}(1 - pAvg) + \frac{G^3}{3!}e^{-G}(1 - pAvg)^3 + \frac{G^k}{k!}e^{-G}(1 - pAvg)^{(1+2+\ldots+k-1)} \right]$$

and

$$k = ceil\left(\frac{d}{R/2}\right).$$

22. A method for communicating between a base station and a plurality of user terminals in a communication network using dynamically controlled persistent techniques comprising the steps of:

providing from at least one random access channel for accessing said communication network;

transmitting from said plurality of user terminals which are synchronized with a system time of said communication network access requests to said at least one random access channel during one of a plurality of predetermined time slots;

determining at said base station when more than one said access request is received during a particular time slot resulting in a collision between the received access requests;

measuring at said base station the number of collisions occurring during a predetermined time interval to determine a collision slot rate;

comparing at said base station said determined collision slot rate to a threshold value; and

adjusting at said base station the number of access attempts any one of said plurality of user terminals may make to said at least one random access channel during a particular call session.

23. The method according to claim 22, further comprising the steps of:

adjusting at a base station controller of said base station a maximum retry limit to optimize said collision slot rate for a particular load on said at least one random access channel, wherein said maximum retry limit represents the maximum number of access attempts to the random access channel a particular user terminal may attempt during a particular call session; and

broadcasting from a base transceiver station of said base station said maximum retry limit to said plurality of user terminals.

24. The method according to claim 23, further comprising the steps of:

determining at said base transceiver station said collision slot rate and transmiting said collision slot rate to said base station controller;

comparing at said base station controller the determined collision slot rate to a threshold value;

adjusting at said base station controller said maximum retry limit accordingly, to optimize the collision slot rate for a particular random access channel load;

transmitting at said base station controller said adjusted maximum retry limit to said base transceiver station; and

broadcasting from said base transceiver station said adjusted maximum retry limit to said plurality of user terminals.

25. The method according to claim 24, further comprising the step of:

blocking at said base station controller the access requests having a predetermined priority when said collision slot rate exceeds a predetermined threshold value.

26. The method according to claim 24, further comprising the steps of:

calculating at said base station controller for an optimal offered load of said at least one random access channel an optimal collision slot rate;

storing at said base station controller said optimal collision slot rate in a transition matrix;

comparing at said base station controller the determined collision slot rate to the optimal collision slot rates within said transition matrix and adjusting the maximum retry limit accordingly.

27. The method according to claim 26, wherein:

the optimal collision slot is calculated in terms an optimal offered load on said at least one random access channel by said base station controller according to an algorithm where:

S = throughput, or the mean number of packets successfully received by the base station per timeslot;

G = offered rate, or the mean number of packets offered to the channel per time slot;

P_c = probability of a collision for an arbitrary transmission from a user terminal;

R = transmission burst size for the access channel (excluding guard time) in ms, typically less than the length of a timeslot;

d = cell delay variation (max delay to base station – min delay to base station) in ms;

the throughput and offered load are related by the equation:

$$S = G(1 - P_c), \qquad (1)$$

where

$$P_c = 1 - e^{-G} \qquad (2)$$

where the optimal collision slot rate (CSR) value is determined by an equation yielding CSR in terms of G:

$$CSR = 1 - \left[e^{-G} + Ge^{-G} + \frac{G^2}{2!}e^{-G}(1 - pAvg) + \frac{G^3}{3!}e^{-G}(1 - pAvg)^3 + \frac{G^k}{k!}e^{-G}(1 - pAvg)^{(1+2+\ldots+k-1)} \right]$$

and

$$k = ceil\left(\frac{d}{R/2}\right).$$

28. A computer program product including a computer readable medium containing instructions for optimizing random access channel performance in a communication network using dynamically controlled persistence techniques, said instructions comprising the steps of:

providing from a base station at least one random access channel, including a plurality of time slots having a predetermined duration, for receiving network access requests and allowing access to said communication network;

determining at said base station when more than one said access request is received during a particular one of said plurality of time slots, resulting in a collision between the received access requests;

measuring at said base station the number of collisions occurring during a predetermined time interval to determine a collision slot rate; and

comparing at said base station the determined collision slot rate to a predetermined value.

29. The computer program product according to claim 28, wherein a plurality of user terminals are synchronized with a system time of said communication network and transmit said access requests to said at least one random access channel during one of said plurality of predetermined time slots, said instructions further comprising the step of:

adjusting at said base station the number of access attempts any one of said plurality of user terminals may make to said at least one random access channel during a particular call session.

30. The computer program product according to claim 29, said instructions further comprising the step of:

adjusting at a base station controller of said base station a maximum retry limit to optimize said collision slot rate for a particular load on said at least one random access channel, wherein said maximum retry limit represents the maximum number of access attempts to the random access channel a particular user terminal may attempt during a particular call session.

31. The computer program product according to claim 30, said instructions further comprising the steps of:

determining at a base transceiver station of said base station said collision slot rate and transmiting said collision slot rate to said base station controller;

comparing at said base station controller the determined collision slot rate to a threshold value; and

adjusting at said base station controller said maximum retry limit accordingly, to optimize the collision slot rate for a particular random access channel load.

32. The computer program product according to claim 31, said instructions further comprising the step of:

blocking at said base station controller the access requests having a predetermined priority when said collision slot rate exceeds a predetermined threshold value.

33. The computer program product according to claim 32, said instructions further comprising the steps of:

calculating at said base station controller an optimal collision slot rate at an optimal offered load of said at least one random access channel;

storing at said base station controller said optimal collision slot rate in a transition matrix; and

comparing at said base station controller the determined collision slot rate to the optimal collision slot rates stored within said transition matrix and adjusting the maximum retry limit accordingly.

34. The computer program product according to claim 33, wherein:

the optimal collision slot is calculated in terms an optimal offered load on said at least one random access channel by said base station controller according to an algorithm where:

S = throughput, or the mean number of packets successfully received by the base station per timeslot;

G = offered rate, or the mean number of packets offered to the channel per time slot;

P_c = probability of a collision for an arbitrary transmission from a user terminal;

R = transmission burst size for the access channel (excluding guard time) in ms, typically less than the length of a timeslot;

d = cell delay variation (max delay to base station – min delay to base station) in ms;

the throughput and offered load are related by the equation:

$$S = G(1 - P_c), \quad (1)$$

where

$$P_c = 1 - e^{-G} \quad (2)$$

where the optimal collision slot rate (CSR) value is determined by an equation yielding CSR in terms of G:

$$CSR = 1 - \left[e^{-G} + Ge^{-G} + \frac{G^2}{2!} e^{-G}(1 - pAvg) + \frac{G^3}{3!} e^{-G}(1 - pAvg)^3 + \frac{G^k}{k!} e^{-G}(1 - pAvg)^{(1+2+\ldots+k-1)} \right]$$

and

$$k = ceil\left(\frac{d}{R/2} \right).$$